reconsideration and allowance of this application are respectfully requested.

At the outset, it is noted that a shortened statutory period of three (3) months was set in the November 6, 2002 Official Action. The initial due date for response, therefore, was February 6, 2003. A petition for a one (1) month extension of the response period is presented with this amendment and request for reconsideration, which is being filed within the one (1) month extension period.

As another preliminary matter, it is noted that the "clean copy" of claim 3 that was included with the Preliminary Amendment filed August 31, 2001 is deemed objectionable because it contains brackets in the word "favors" which were carried over from the copy of the amended claims. The new "clean copy" of amended claim 3 which is required to be submitted in this response is included with the "clean copy" of the claim amendments presented herewith.

In the November 6, 2002 Official Action, claims 29 stands rejected under 35 U.S.C. §101 as allegedly directed to non-statutory subject matter. According to the Examiner, the strain of microorganism recited in claim 29 exists in nature.

Claims 2 and 29 have been rejected under 35 U.S.C. §112, first paragraph, based on alleged inadequate enablement. In this connection, the Examiner asserts that the specification does not disclose a repeatable process to obtain the microorganism of claims 2 and 29, and it is not clear from the

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specification or record that the microorganism is readily available to the public. The Examiner goes on to provide helpful guidance on how this rejection may be overcome, depending on whether or not a deposit has been made under the Budapest Treaty.

Claims 1, 7, 10-13 and 21-23 have been rejected under 35 U.S.C. §112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. The specific claim terminology deemed objectionable in this regard is set out at pages 4 and 5 of the November 6, 2002 Official Action and is addressed in further detail hereinbelow.

Claims 1-3, 21-23 and 29 have been rejected under 35 U.S.C. §102(b) as allegedly anticipated by U.S. Patent No. 5,279,950 to Labuda et al.

The foregoing objection and rejections constitute all of the grounds set forth in the November 6, 2002 Official Action for refusing the present application.

The Examiner acknowledges that claims 6-9 and 10-13 are free of the prior art of record and that claims 7, 8 and 10-13 would be allowable if rewritten in independent form to overcome the above-mentioned rejection under 35 U.S.C. §112, second paragraph.

In accordance with the present amendment, claim 1 has been amended to specify the deposit number of the strain of *Pseudomonas putida* used in the method of the invention and to further recite that the vanillin accumulates in the culture

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medium. See page 35 of the present specification. Claim 7 has been amended to recite appropriate "Markush" language. Claim 10 has been amended to indicate that the recited temperature range is in degrees Celsius. Claim 11 has been amended to recite that step (a) comprises heating in water. Claim 12 has been amended to recite that the enzyme composition having ferulic acid esterase activity is one derived from a species of *Aspergillus* or from *Humicola insolens*. Claim 13 has been amended to delete the word "substantially". Claim 21 has been amended by replacing the phrase "at least one desired component" with "vanillin".

As a result of these amendments to claims 1, 7 and 10-13, the various 35 U.S.C. §112, second paragraph rejection of these claims, as set forth in the November 6, 2002 Official Action, are believed to be overcome.

The 35 U.S.C. §112, second paragraph, rejection of claims 22 and 23 is considered moot in view of the cancellation of claims 22 and 23. Applicants cancellation of claims 22 and 23 is without prejudice to their right to file a continuing patent application, as provided under 35 U.S.C. §120, with respect to the subject matter of those claims.

The new claims presented herewith, i.e. claims 46-53, all have support in the specification as originally filed. Specifically, claim 46 is a combination of original claims 1 and 3, including the recitation that the vanillin accumulates in the culture medium.

Claims 47 and 48 recite pH values which are based on the present specification at page 32, line 18 through page 34, line 9, particularly page 34, lines 5-7.

Claim 49 corresponds to original claim 6, which has been rewritten as an independent claim with a revised preamble, and further reciting that the vanillin accumulates in the culture medium. As noted above, claim 6 has been found by the Examiner to be free of the prior art.

Claims 50 and 51 correspond to original claims 2 and 3, but are dependent from claim 49.

Claims 52 and 53 correspond to original claim 21, but are dependent from claims 46 and 49, respectively.

As presently amended, claims 7, 9 and 11 are dependent from claim 47, rather than claim 6.

An Abstract on a separate sheet is also presented herewith.

No new matter has been introduced into this application by reason of any of the amendments presented herewith.

As a result of the foregoing amendments, any indefiniteness or lack of clarity that may have been engendered by the original terminology of claims 1, 7 or 10-13 has now been eliminated. Thus, the only matters remaining to be addressed are the 35 U.S.C. §101 rejection of claim 29, the 35 U.S.C. §112, first paragraph, rejection of claims 2 and 29 and the 35 U.S.C. §102(b) rejection of claims 1-3, 21-23 and 29. These last-mentioned grounds of rejection are respectively traversed.

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A. Claim 29 Does Not Call for a Strain Microorganism Which Exists in Nature and Therefore Cannot Constitute Non-Statutory Subject Matter

The 35 U.S.C. §101 rejection of claim 29 cannot be maintained as it is based on a demonstrably false premise. Contrary to the Examiner's assertion, the strain of microorganism recited in claim 29 does not exist in nature. Claim 29 is directed to the deposited strain IMI 382568. As disclosed at page 10, lines 25-26 of the present specification, IMI 382568 is strain ZYL 581. As disclosed at page 32, paragraph (a) of the present specification, this strain was created by chemical mutagenesis of another strain, i.e. CYL 503. Accordingly, the strain of microorganism recited in claim 29 cannot reasonably be characterized as a product of nature and this ground of rejection should, therefore, be withdrawn.

B. The 35 U.S.C. §112, First Paragraph Rejection of Claims 2 and 29 is Overcome by the Declaration of Peter S.J. Cheetham Which is Submitted Herewith

The Declaration of Deposited Materials submitted herewith complies with requirements set out at page 3 of the November 6, 2002 Official Action by establishing that the deposit was made under the terms of the Budapest Treaty and that the deposited strain will be irrevocably and without restriction or condition released to the public upon issuance of a patent on the present application. It is noted in this connection that the present specification states the date of deposit, the number granted the deposit by the depository and the name and address

of the depository. All of this information appears at page 10, lines 5-7 and 25-26 of the present specification.

The declarant, Peter S.J. Cheetham, has made this declaration in his capacity as Director of Zylepsis Limited, the applicants' assignee. Evidence of the ownership rights of Zylepsis Limited is provided by the Assignment from the applicants to Zylepsis Limited, which was duly recorded with the United States Patent and Trademark Office on August 23, 2001 at Reel 012309 and Frame 0276. A copy of the recorded Assignment is attached.

C. U.S. Patent No. 5,279,950 to Labuda et al. Cannot be Interpreted as Anticipating the Subject Matter of Claims 1-3, 21 and 29, as Now Amended

Claims 1-3, 21 and 29, as presently amended, all specify *P. putida* IMI382568 as the organism that converts ferulic acid into vanillin. As noted above, this strain was created by chemical mutagenesis of ZYL503. Labuda et al., on the other hand, discloses processes of converting ferulic acid into vanillin using a particular strain of *P. putida* designated as ATCC 55180. There is no mention in Labuda et al. that *P. putida* ATCC 55180 was modified in any way. The main teaching of Labuda et al. is that "vanillin accumulation... can be materially increased through the incorporation of a sulfhydryl compound" (column 2, lines 30-33). The present invention does not require the addition of a sulfhydryl compound.

Even with the use of such compounds, the greatest

yields achieved by Labuda et al. are quite low. For example, the very highest concentration of vanillin achieved by Labuda et al. appears to be that disclosed in table 1 in Example 1 (column 9), where mixture 3 eventually lead to 210μg/ml, that is, 0.21gl^{-1}, after an astonishing period of 1,296 hours. In the present application, by contrast, Example 6(b), at pages 32 to 34 of the present specification discloses that "after 43h at pH 8.5 the vanillin concentration was 2.247gl^{-1}, a molar yield of 73% for the ferulic acid consumed" (page 34, lines 7-9).

In other words, the best process taught by Labuda et al., including the addition of dithiothreitol, gave a yield that was less than a tenth of that attained by applicants method. Furthermore, applicants' yield of 2.247gl^{-1} was achieved in under two days, whereas the yield of 0.21gl^{-1} of Labuda et al. took nearly two months. It appears that the yield of Labuda et al. at 43 hours would have been substantially under 40μg/ml, that is, under 0.04gl^{-1}. Clearly the best process taught by Labuda et al. would be of dubious commercial value.

Strain-specific results.

The Examiner comments that Labuda et al. disclose a method involving "conditions of pH and temperature necessary to promote the production and accumulation of vanillin". These are nothing more than conventional references to the fact that suitable conditions must be chosen for the organisms to grow. Indeed Labuda et al. show no appreciation of the significance of these factors to the result obtained. In the present application, applicants clearly establish the importance of pH

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on controlling the outcome of the process. Example 6(b) at pages 32 to 34 of the present specification shows the different outcomes of reaction at pH 8.0 and pH 8.5. At pH 8.0, the yield of vanillin after 48 hours ($0.577gl^{-1}$) is much greater than anything achieved by Labuda et al., but it is only about a quarter of that achieved at pH 8.5. The difference is that, at pH 8.0, large quantities of vanillic acid are produced, whereas at pH 8.5, hardly any vanillic acid is produced.

In contrast, Labuda et al. teach that "Preferred pH is between about pH 3 and about pH 7" (Column 6, lines 11 to 12). Nothing is said about the pH used in Examples 1 and 4. These are presumably similar to the pH's used in Example 3 (pH 5.1 and 7.0), which uses a different microorganism but the same media.

The Examiner's attention is also respectfully directed to Column 4 lines 17 to 21 of Labuda et al., where it is stated that "Vanillic acid and/or 4-vinylguaiacol are also commonly found as ferulic acid degradation products, usually at concentrations exceeding that of vanillin". Nothing is said, however, about the amounts of these products produced in the actual examples. It seems very likely that they were produced in much greater quantities than vanillin.

Concerning the subject matter of original claim 3, Labuda et al. is entirely silent about any effects of pH on the ratio of vanillic acid to vanillin. It simply accepts that vanillic acid and/or 4-vinylguaiacol will be produced "at concentrations exceeding that of vanillin".

In summary, it is clear that the use of *P. putida* IMI 382568 in the conversion of ferulic acid into vanillin represents a major advance in the art, in comparison to anything taught or suggested by Labuda et al. It makes possible a process for producing vanillin in yields which are orders of magnitude greater than those achievable by Labuda et al., without the need for added sulfhydryl compounds.

In view of the present amendments and the foregoing remarks, it is respectfully requested that the objection and rejections set forth in the November 6, 2002 Official Action be withdrawn and that is application be passed to issue, and such action is earnestly solicited.

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PJH:ksk
Enclosures: (1) Declaration of Deposited Materials
(2) Copy of Recorded Assignment for U.S. Patent Application No. 09/914,224
(3) Abstract of the Disclosure

Marked-Up Version of Amended Claims

1. (Amended) A method of converting a first composition comprising ferulic acid into a second composition comprising vanillin, said method comprising treating said first composition with *Pseudomonas putida* IMI 382568 under conditions such that ferulic acid is converted into vanillin, and the vanillin accumulates in the culture medium.

2. (Amended) A method according to claim [1] 46 wherein said strain is *Pseudomonas putida* IMI 382568.

7. (Amended) A method according to claim [6] 47 wherein said plant material is selected from the group consisting of maize, wheat, sugar beet and rice materials.

9. (Twice Amended) A method according to claim [6] 47 wherein in step (a) the plant material is treated with a solution containing citric acid.

10. (Amended) A method according to claim 9 wherein said plant material is treated in the temperature range 50-250°C.

11. (Amended) A method according to claim [6] 47 wherein the plant material comprises sugar beet fibre and step (a) [involves] comprises heating in water.

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12. (Twice Amended) A method according to claim 6 wherein [step (b) employs an enzyme derived from] said enzyme composition having ferulic acid esterase activity is one derived from species of *Aspergillus* or from *Humicola insolens*.

13. (Amended) A method according to claim [10] 12 wherein the enzyme is derived from *Humicola insolens* and treatment is effected [substantially] in the pH range 6-7.

21. (Twice Amended) A method according to claim 1 wherein said conversion into vanillin is effected in an aqueous phase which is contacted with an organic phase which extracts said [at least one desired component] vanillin.

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